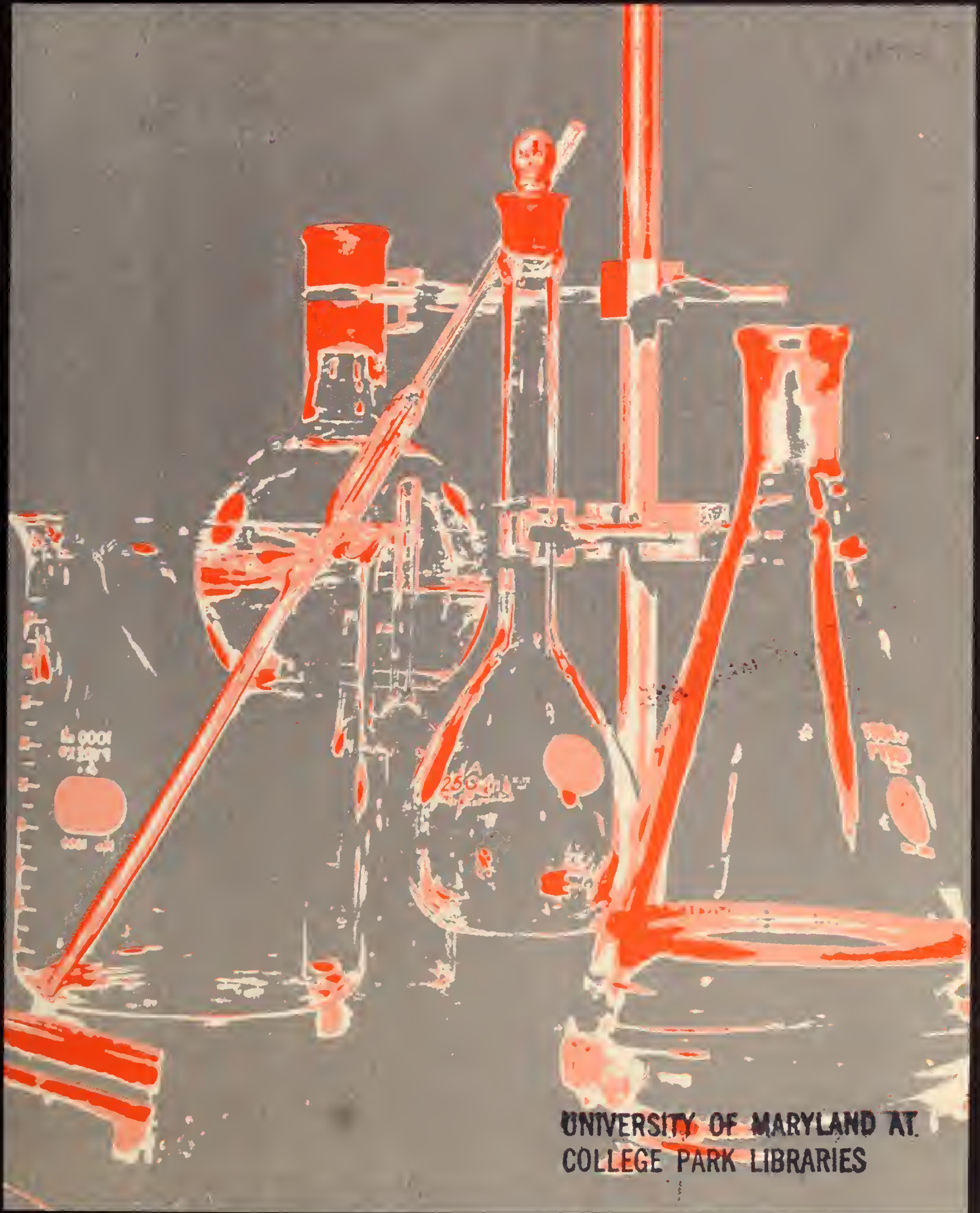
ARCV
UPUB
A33.001
1974

Meeting Tomorrow's Needs Through Research Today



UNIVERSITY OF MARYLAND AT
COLLEGE PARK LIBRARIES

Annual Report of the University of Maryland Agricultural Experiment Station
University of Maryland College Park, Maryland March 1975

Maryland Agricultural Experiment Station.
[Annual report]

Introduction

A recent article in the Washington Star-News stated that it was the intent of a national consumer group to make food a national issue from the standpoint of production, distribution and pricing. The Maryland Agricultural Experiment Station has been concerned about this issue ever since March 6, 1888, the date of its founding.

The first experiments carried out by the Station were recorded in Experiment Station Bulletin No. 1, June, 1888: "Twelve acres have been carefully laid out in plots and cultivated in even-growing plants, without manure, to determine the uniformity and natural productiveness of the soil. One acre is devoted to trials with potatoes, several acres in oats, more in a variety of fodder crops, and a considerable area is being specially prepared for horticultural purposes."

Early agricultural scientists knew the need for increased efficiency and productiveness to meet the demands of a growing public.

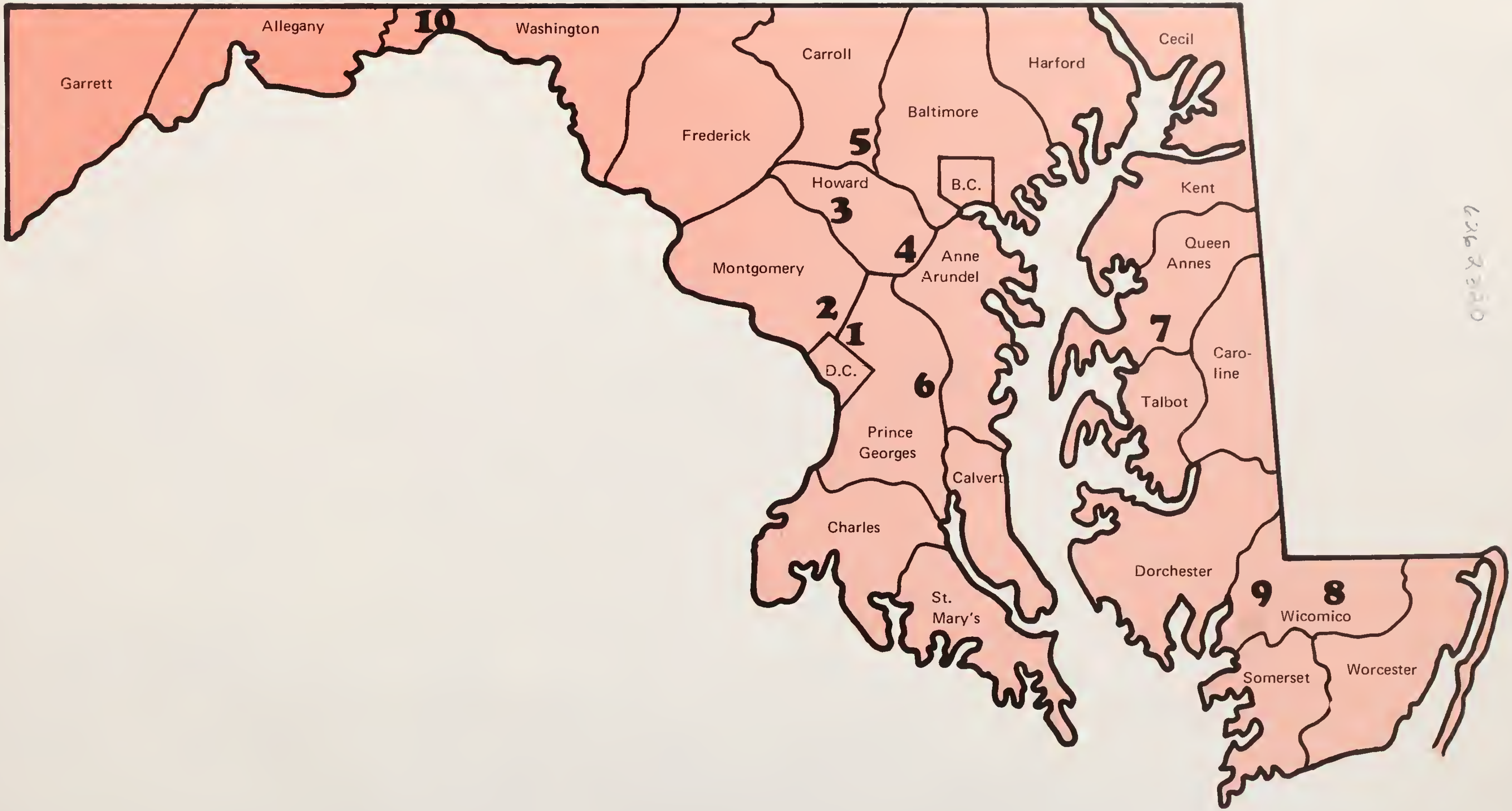
Even though the Maryland Agricultural Experiment Station started on a very small scale, the main goals fall very much in line with the objectives of the Experiment Station today. "It will be the aim of the Maryland Agricultural Experiment Station to prove itself of real use to the great agricultural and horticultural interests of the state . . ." That aim is still the most integral part of the Maryland Agricultural Experiment Station of today.

It is only when the needs of Maryland's agricultural interests are met that anything of benefit can come the way of the consumer. If the price of agricultural products cannot be held down through improved varieties, increased efficiency, better marketing practices, total product utilization, and better harvesting and processing methods, then the consumer will suffer. Improvement in any field is dependent upon research, and that is what Maryland's Agricultural Experiment Station provides.

Archives
UPUB
A33.041
1974

Research is presently being carried out on eight farms throughout the state and on the College Park campus. There are nearly 125 scientists and engineers engaged, either full or part time, in research activities of the Station. There are 201 projects underway dealing with all phases of agriculture. These include the socio-economics of crop production, harvesting, processing for utilization by humans, birds or animals and for optimal use of land and water resources.

In the following sections we would like to highlight some of the more recent accomplishments of these projects.


Garrett
Allegany
10
Washington
Frederick
Carroll
5
Baltimore
Harford
Cecil
Howard
3
B.C.
Kent
4
Anne Arundel
Queen Annes
Montgomery
2
1
7
D.C.
Caro-line
6
Talbot
Prince Georges
Calvert
Charles
Dorchester
9
8
Wicomico
St. Mary's
Somerset
Worcester

6262320

EXPERIMENTAL FARMS

1. Maryland Agricultural Experiment Station. Headquarters 1328 Symons Hall. Established 1888. Research work in all phases of agriculture and related fields.
2. Plant Research Farm (Montgomery County). Research on turfgrass, insects, truck crops and small fruit. 320 acres.
3. Agronomy-Dairy Forage Farm (Howard County). Studies of dairy nutrition and management, forage production, swine nutrition and management and pollution abatement practices. 926 acres.
4. Horse Research Center (Howard County). Experiments studying physiology, nutrition and management of horses. 160 acres.
5. Beef Research Center (Carroll County). Research concerning livestock production and management. 720 acres.
6. Tobacco Research Farm (Prince George's County). Research relating to tobacco breeding, production, harvesting and curing. 206 acres.
7. Wye Institute (Queen Anne's County). Work on plant breeding, weed and disease control, and production systems for corn, soybeans, vegetables and ornamentals. 125 acres.
8. Salisbury Research Substation (Wicomico County). Experimental studies dealing with poultry and breeding, insect, pest and disease control, production systems and management and processing of vegetable crops. 89 acres.
9. Poplar Hill Research Farm (Wicomico County). Studies of disease control, breeding, pest control and production systems for corn, soybeans and vegetable crops. 100 acres.
10. Fruit Research Center (Washington County). Research on fruit production, disease control and fruit insects. 28 acres (leased).

AGRICULTURAL ENGINEERING

Much of the research on tobacco has focused on harvesting and curing, because farm labor is becoming scarcer. Here, Paul Winn, Jr., Agricultural Engineer, talks about a new curing process which eliminates a lot of tedious labor and also requires less space than conventional methods now used on Maryland farms.

Tobacco Harvesting

During the past two years, agricultural engineers and agronomists have been experimenting with a revolutionary labor-saving system for handling and harvesting Maryland tobacco. The system includes a mechanical harvesting aid for priming tobacco and modified low temperature curing chambers. The potential for labor savings is greater than with systems presently used on Maryland farms.

The experimental system's biggest potential is the elimination of hand-stripping, a traditional winter chore which has long been a tedious bridge between field cutting and the tobacco auction market in late spring.

Sweet Potato Harvesting

Harvesting is a costly phase of producing sweet potatoes for the fresh market. Labor costs are not only high, but the availability of personnel is scarce. Work by the Agricultural Experiment Station led to the development of equipment and techniques to harvest sweet potatoes in a once over operation. The successful demonstration of these techniques led to the acceptance and use by industry and to the commercial manufacture of machines. Commercial machines should be available to Maryland growers within two to three years.

Composting Dairy Manure

Dairy cows, on the average, produce four pounds of manure for each pound of milk. The 150,000 dairy cows in Maryland produce 3.25 million tons of manure each year. For farmers with sufficient land area to spread this material, this presents little problem. However, other farmers with high animal density or close proximity to urban developments must adopt other methods of utilizing this by-product. A pilot scale mechanized composting system for the College Park campus 80 cow dairy herd—using thermophilic microorganisms—reduced the potential of pollution by dairy manure.

Since almost all the odor is eliminated by this process, the composted manure may be spread anywhere on the farm, even near urban neighbors. This has immense possibilities for many of Maryland's dairy farmers who are beginning to feel the squeeze of urbanization and the cries of those moving in around them.

Broiler Efficiency

Margin of profit in broiler production is very small. Any improvement in efficiency could have a marked effect on net income. For the past several years, agricultural engineers have worked to determine the best environmental conditions to maintain in broiler houses to optimize production.

Preliminary findings are being reported to the producers and indications are that a number of the findings are being utilized. For example, with current energy problems, knowledge that starting temperature of 80 degrees, with temperature reductions of five degrees twice a week to seventy degrees resulted in significantly less fuel consumption. These and other factors have shown how research can improve production efficiency.

Temperature Studies On Clams

Studies of the soft shell clam have produced data describing the growth rate of bacteria in clams at six temperature environments. This data will be used to determine temperature to be maintained on board clam boats during processing and transportation.

A second accomplishment led to information on techniques for cooling soft shell clams on board harvesting boats. The effect of container design on cooling rate of clams has been defined for several containers. And, the effect of air flow rate on the cooling rate has been studied to a limited extent.

AGRICULTURAL AND RESOURCE ECONOMICS

Land devoted to farming has continually shrunk as a result of the squeeze of urbanization, new highway programs and land developments. Studies on new land use programs to control further farmland depletion have been undertaken.

Labor Requirements Reduced

Pioneering research in Maryland on the economics of dairy cattle feeding and the economics of labor and capital resource use has been widely applied not only in Maryland, but in many other major milk producing areas in the United States and foreign countries.

In 1955-59, an average of 1.7 hours were required to produce 100 pounds of milk. By 1971-73, dairymen had reduced labor requirements to 0.6 hours per hundred weight, as a result of Maryland research. A further reduction occurred in 1974 as labor used annually per milk cow declined and milk per cow increased.

Meeting Broiler Competition

Through a concerted effort to reduce cost disadvantages relative to other producing areas, broiler integrators have reduced plant condemnations from 4.13 percent to 1.91 percent during the 1967-73 period.

Based on 1973 data, this was comparable to an increased yield of 0.05 pounds of meat per bird and increased revenue of 0.35 cents per pound of ready-to-cook meat. This gain over other broiler producing areas enabled Maryland and Delmarva to reduce 1.5 and 2.4 million dollars, respectively, of the cost disadvantage to other areas on condemnations alone.

Bay Resources Evaluated

The world community has become increasingly aware of the sea and its resources. The increasing pressure of world population expansion is expected to lead to more intensive exploitation of the fishery resources of the world's oceans and its estuarine systems. The Chesapeake Bay represents one such system.

A recently completed study by the Department of Agricultural and Resource Economics revealed that supplies will be sufficient to meet the future demand for alewife, menhaden, soft-shell clams, oysters, yellow perch, sea bass and catfish. However, the research also showed that overfishing was indicated for most of the above mentioned species. Excess demands were indicated for blue crab, white perch, shad, flounder, spot, weakfish, striped bass and eel. Where excess demands were indicated, recreational pressures were found to be as intense and in some cases more intense than commercial use of the species.

This research points out the urgent need for the formulation of a public policy regarding the resources of the Bay.

Economic Impact of Racing

In 1969, the Thoroughbred Owners and Breeders Association turned over to the National Association of State Racing Commissioners an outline of a proposed economic analysis of the nation's racing industry. Of the more than twenty states which initiated the research only Maryland completed the research as originally envisioned. Four major benefits have resulted from the study.

First, detailed data on every segment of the racing industry has been compiled and made available in tabulated form and computerized for further need.

Second, an economic analysis and publication of the economic impact on Maryland racing was completed. The publication gave legislators and the general public a new perspective on the importance of the racing industry.

Third, an economic analysis of the attendance and wagering was completed. This data helped in the evaluation and recommendations made concerning increasing and reapportioning racing days.

Fourth, the thoroughbred yearling market was studied and the results were presented to horsemen by seminar, publication and personal contact.

Land Rights Study

Land in farms in Maryland has shown continual decrease in the past few years. Implications of this in terms of effects on production of agricultural products, environmental conditions and the quality of life is becoming of increasing concern to large numbers of people.

A program was set up to test the effect possible transfer of development rights, in addition to the conventional surface rights, would have on land use patterns.

Tentative conclusions indicate the "development rights" procedure would have little effect on land use patterns if left entirely to market forces. Difficulties which emerged would require some government action.

Planning for Parks

Measuring people's preferences for nonmarket goods is a difficult task, but Station researchers have devised new methods of measurement. They tested their theory by measuring demand for various types of state parks in Maryland. Preliminary analysis of the data collected indicates that the work should aid the Maryland State Park Division in its planning.

One example of the results showed that when budget wasn't a concern, 48 percent of the Maryland State Park users would like to have the state build a resort complex similar to that of West Virginia. However, only 22 percent wanted the complex built if it meant giving up an equal dollar amount of additional parks of the type the state is currently supplying.

AGRICULTURE AND EXTENSION EDUCATION

Measuring Leadership

Leadership is a trait that most people feel can't be measured. However, the Department of Agriculture and Extension Education developed a six function measure of leadership effectiveness of nutritional aides in Extension. They showed that leadership is highly associated with amount and type of training received. The measures can be used to measure aide effectiveness and to indicate the effectiveness and adequateness of training programs. Since the same type programs are used in all the states, the leadership effectiveness profile can be used nationwide.

Changes In Maryland

Demographic publications analyzing population, social and economic conditions and changes in Maryland have been developed. They are in use in secondary schools throughout the state.

State Forest Use

How much are the state forest areas used? That was one of the questions investigators tried to answer when they developed a user/activity profile. They also gathered information on extent of activities, location concentration of users and demographic information on the users. To date, this information has been used to divide the Savage River State Forest into subunits based upon levels of use. The practice allows for a more efficient use of forest areas and resource management.

As demands for recreation areas continue to grow, plans for the most efficient use of forest land become necessary. By tabulating the activities of park users, plans can be drawn up to meet the challenges of an expanding population on State forest areas.

AGRONOMY

Better Soybeans Developed

Maryland and Virginia Experiment Stations jointly released a new soybean variety, Shore, in 1974. Shore is a high yielding variety with resistance to Mexican bean beetle, a serious insect pest in Maryland. It is estimated that the use of this new variety will reduce soybean yield losses as much as $2 million annually.

Grass and Drought

Research on turfgrass continues to provide valuable information to the people of Maryland. Research on drought tolerance revealed the following varieties and mixtures to be very good.

A. Bluegrass varieties—Merion, Baron, Vantage, Windsor and Sodco.

B. Kentucky 31 Tall Fescue.

C. A mixture of 40% Merion, 20% Fylking, 20% South Dakota Certified and 20% Pennlawn Creeping Red Fescue.

This information is very useful in developing turfgrass recommendations for homeowners and professional turfgrass managers.

No-Till Interest Climbs

Nearly 1,100 persons turned out recently to learn more about no-till cropping practices. This shows how readily research results on weed control, fertilization, row widths and cropping systems have been accepted by farmers in Maryland. It is estimated that more than 50 percent of the corn grown in Maryland during 1974 used no-till systems.

Sewage Sludge Fertilizes Crops

Commercial fertilizer is in short supply at this time. Research over a three-year period shows that sewage sludge increases the yields of corn and soybeans very markedly. Presently, studies are focusing on safe levels of sludge that can be used. Establishing these parameters will help alleviate two problems facing parts of Maryland's economy.

Broiler production in Maryland is a multimillion dollar industry. The broiler litter produced has been considered a waste product in the past. However, at current fertilizer prices, the litter produced by a 100,000 broiler operation could be worth $2,500. Research has shown that this litter will supply considerable plant nutrients. Reducing the need for commercial fertilizer will help greatly to conserve energy and at the same time increase crop production in Maryland.

Stream Pollution Studies

Research pertaining to possible stream pollution by runoff from land areas treated with manure showed that with both forest and pasture land vegetation, chemical and biological pollutants were transported less than 25 feet. Streams located 200 feet from the area of manure application exhibited no pollution that could be attributed to manure application. This type of information has been urgently needed and will be very valuable to people of Maryland and the world.

New Alfalfa Release

Arc—a new pest resistant alfalfa variety—may increase the value of the nation's top forage crop by more than $200 million annually. Arc was released in 1974 by the Agricultural Experiment Stations in Maryland, Virginia, North Carolina, Pennsylvania and USDA. In Maryland, Arc yielded one to two tons more hay per acre than other varieties currently being grown. Arc has outstanding resistance to anthracnose, a fungus disease. It also has a high resistance to the pea aphid and a moderate resistance to bacterial wilt disease and the alfalfa weevil.

Two New Tobacco Varieties

Estimates indicate that Md. 872 and Md. 201, two new tobacco varieties released in 1974, should add $1.5 million to the tobacco industry in Maryland. Nearly 25 percent of the total amount of seed distributed in Maryland for 1974 was in these two new varieties.

Maryland is a leading turfgrass producing state in the East. Information developed by the Agricultural Experiment Station has been beneficial for both the homeowner and the professional turfgrass manager.

During the past eight years, the Maryland Agriculture Experiment Station has released seven new varieties of soybeans. More than 75 percent of the soybean acreage in Maryland is planted with these varieties.

ANIMAL SCIENCE

Profits By Selection

Tests at the University of Maryland have shown that a rigorous selection program for decreased backfat thickness and increased yield can pay off for swine producers. The University swine herd has reduced by 25 percent the amount of backfat and increased the amount of edible lean pork by 35 percent using this selection program.

Swine Feeding Results

Genetically improved swine require about two percent higher protein levels than other swine, according to research by the Department of Animal Science. Failure to provide the elevated protein levels prevented genetically superior swine from maximizing the yield of edible lean pork. Furthermore, the gains achieved on the higher protein levels required less feed per pound of gain. Data showed that a total feed savings of about 144 pounds for each pig could be achieved from weaning to average market weight of 220 pounds. Less feed costs eventually mean lower prices for the consumer.

Measuring Reproductive Performance

Maximizing reproductive efficiency is the fundamental key to economic and biological efficiency for food producing animals. Research efforts to further improve and effectively control the reproductive efficiency of swine have been confounded by the previous inability to measure the extremely small quantities of pituitary gland and ovarian hormones which control the reproductive process. Findings by the Department of Animal Science have provided the tools necessary for measurement of hormonal levels and a description of changes in the hormone levels of female swine in the normal reproductive state. Future work will identify hormone changes which are associated with abnormal performance and exceptional reproductive performance. These findings should have great significance on the swine industry as a whole.

Cattle Breeding and Feeding

Beef cattle quality (acceptability) and cutability (amount of eatable lean meat) are the two most important characteristics of a beef carcass. We, as consumers, want beef that is tasty, tender and juicy with a minimum amount of waste fat. This quality meat usually comes from grain fed cattle. Now with the price of feed grains skyrocketing, what are the alternatives available to beef producers? Research results at the University indicate that improvement in lowering excess fat can be made through breeding and feeding. Tests showed that the percent of lean meat could be increased and less feed grain consumed by following proper breeding and feeding practices.

BOTANY

Nearly all of the tobacco varieties grown in Maryland have been developed by researchers at the University of Maryland. Varieties which show black shank disease resistance have added nearly $900,000 annually to the pockets of Maryland tobacco growers.

Controlling Tomato Disease

The standard program for tomato disease control in Maryland requires eight weekly applications of fungicide. Recent studies have indicated that this number of applications can be reduced, thus saving time and labor. When Difolatan and Bravo are applied at higher than standard concentrations, the residual properties of these protective fungicides extend their control of foliar and fruit diseases of tomatoes, allowing for a longer interval between applications. Thus, the program can be reduced from eight to two applications, spaced approximately four weeks apart. This shortened spray program will give full season disease control on tomatoes at less cost to the grower.

Improved Tobacco Varieties

Black Shank disease appeared in Maryland about 1946 and threatened to seriously curtail tobacco production in the state. A breeding and selection program was undertaken to produce a tobacco resistant to this disease. The Black Shank resistant varieties, Maryland 59 and 609, which resulted from this research were released in 1965. Planting of Maryland variety 609 has increased each year and is presently grown on about 60 percent of the tobacco acreage in Maryland. This variety not only provides a means to control Black Shank disease in Maryland, but has increased the normal tobacco yield even in the absence of disease. The increased yield value of Maryland 609 as compared to the old standard Maryland variety, Catterton, over a six year period averaged $59 per acre. This amounts to an increased income of about $900,000 per year for Maryland tobacco growers. No estimates are available for the value that has been derived from control of Black Shank disease, but this would almost surely be greater than that derived from increased yield.

COLLEGE OF HUMAN ECOLOGY

Prescription Drug Pricing

In recent years there has been increased interest in the cost of prescription drugs and methods for reducing such costs. Two methods believed to be necessary for cost reductions were price posting and price advertising. Retail surveys were conducted in New York City, an area with prescription price posting, and Maryland, an area without price posting. Price data were obtained on two types of drugs; one represented the drug needs of the elderly and the other the needs of the general public.

Large variations were found among pharmacies in prices charged for prescription drugs. This indicates that substantial savings are possible for consumers who comparison-shop. It was estimated that an uninformed consumer in Maryland would pay 40 percent more than necessary for drugs used by the elderly. This figure climbed to 46 percent for prescription drugs in general. New York City figures were 46 percent and 101 percent, respectively. On the average, independent pharmacies charged higher prices than chain pharmacies, however, chain pharmacies did not

Nutritional habits learned as a youngster carry through to adulthood. Members of the Experiment Station staff have been experimenting with different nutrition education approaches for young children. Third graders were used in one pilot project.

offer the lowest prices for all drugs. Thus, consumers must comparison-shop in order to obtain maximum savings.

The fact that price variations were greater in New York City suggests that price posting has been ineffective in stimulating retail competition. This reflects limited consumer response to price posting. It was concluded that price posting should be accompanied by price advertising if consumer information were to play an effective role in reducing the cost of prescription drugs at the retail level.

Adolescence Nutrition

Adolescence is one of the critical periods in growth and mental development. A person's ability to learn and health level are adversely affected by poor nutrition. Station researchers are examining the nutritional needs of the young adolescent child in the county schools of Maryland. When the results are tabulated, we will have a better idea of what is needed to improve the nutrition of many Maryland school children.

Pollution Effects on Clothing

Not only may country living be better for you, it may be better for your clothes too. Studies were conducted on clothing to see what effects urban weathering components had. Weathering components included sunlight, temperature, humidity, atmospheric particulate matter and gaseous pollutants. The research showed that exposure of clothing to polluted urban atmospheres during normal use and care may result in significant economic losses to the consumer. In addition, the consumer may also lose flammability protection.

Nutrition Education

The College of Human Ecology set up a three week nutrition education program for selected third graders to see what effect such a program would have on their nutritional status. Parameters were a written nutrition attitude inventory, a food frequency intake questionnaire, a nutrition knowledge test and hemoglobin values. The study indicated that nutritional status can be an objective measure of the success of a nutrition education program.

Food Quality and Nutrient Retention

USDA studies have shown that there is a decreasing consumption of vegetables. Any effect that shows improved flavor, acceptability and nutrient retention is important in improving consumption of vegetables. Studies underway at the University of Maryland focus on the effects ammonium compounds have on retention of chlorophylls and ascorbic acid during blanching and/or cooking of green vegetables. Results to date give promise of improving both eating quality and nutrient retention by use of ammonium compounds.

DAIRY SCIENCE

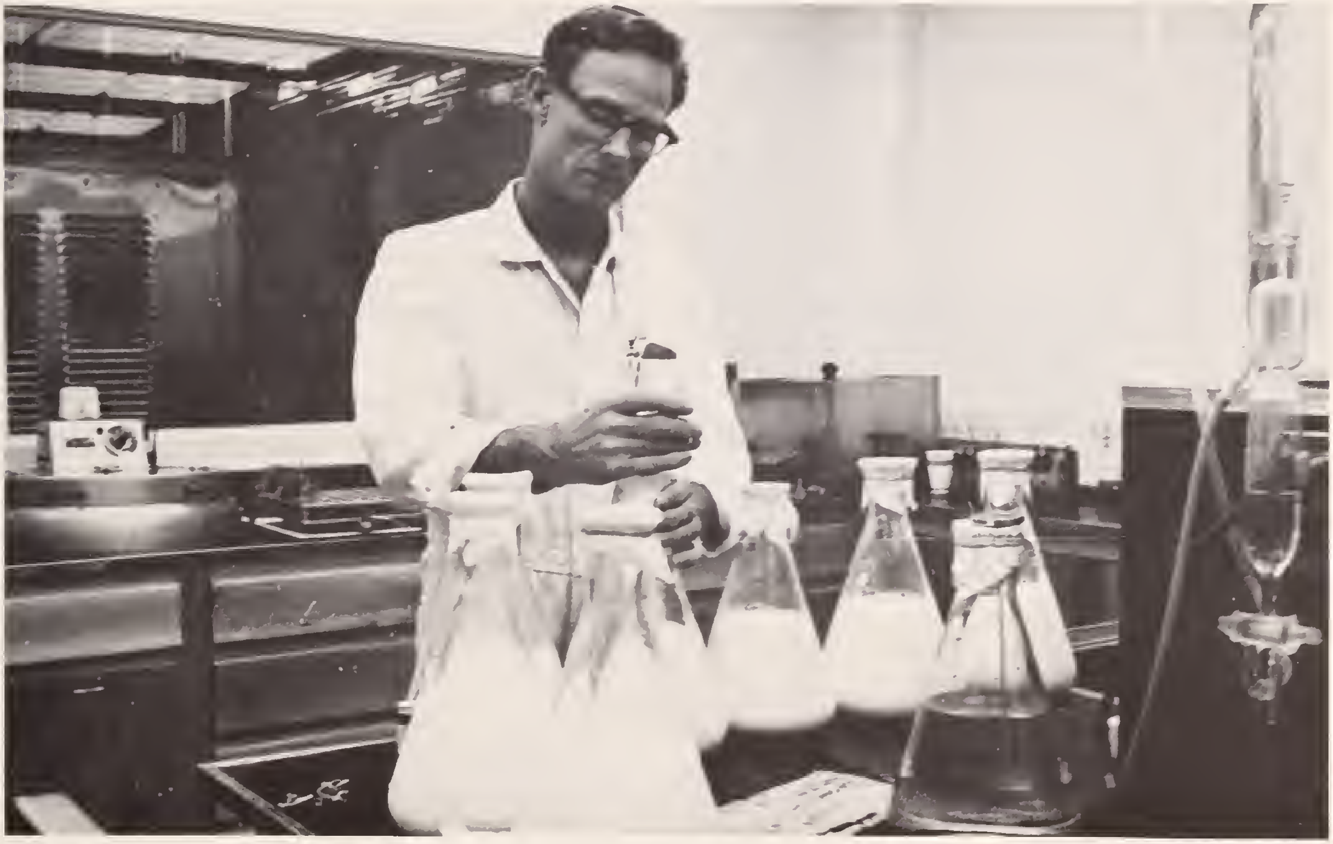
Iodine Supplementation

Work at the Experiment Station has shown that iodine supplementation is needed in Maryland dairy cattle. Prior to this, it was thought that Maryland was not included in the "goiter belt". The work also indicated that soybean meal contains a factor which increases the iodine requirement of farm animals. This discovery has resulted in a change in recommendations of the National Academy of Sciences on the level of iodine that should be given to dairy cattle. Although hard to evaluate, this discovery has prevented many dairy cattle from being on an iodine deficient ration. Supplementation allowed these cows to reach more nearly their inherited capacity.

Whey Products

Almost 85 percent of the total weight of milk used in the manufacture of cheese is lost in the form of liquid cheese whey. This product in the past was classified as waste product. Research has taken tremendous strides in converting these waste products into food products.

Through microbial fermentations, alcoholic beverages such as whey wine and products similar to gin and vodka have been produced. Additional fermentation has produced a whey vinegar. Citrus flavored jellies, jams and fruit drinks were developed using whey as a basic ingredient. Also, whey solids were used in the formulation of ice cream, sherbets and frozen stick confections. Work now



The shelf life of milk in the local supermarket became the focus of one study conducted by dairy scientists at the University. Tests were run to determine the coliform count in milk samples purchased from local stores. Data showed that little danger exists in most cases.

underway indicates that fluid whey will provide an excellent base for a wide range of salad dressings.

Fermentation Studies

Microbial fermentation is essential in the manufacture of such dairy products as cheese, buttermilk and yogurt. Dairy starter cultures are selected for their acid producing ability and desirable flavor components. The isolation and selection of improved cultures is currently being explored at the University of Maryland. The rapidity at which starter cultures can form acid is critical from an economical and public health viewpoint. The shorter the fermentation time the less cost and labor required, and the more remote the possibility of contamination by pathogens.

Shelf Life of Milk

Maryland's milk law now requires that pasteurized milk be marked "sell by date". Requirements state that the "sell by date" shall be seven days following pasteurization. This law was the direct result of the trend toward consumer protection and a progression of a number of manufacturers in increasing the shelf life of milk by raising the pasteurization times and/or temperatures. There has been interest in shortening the "sell by date" to four days.

Dairy researchers wanted to know whether this was necessary. They sampled the pasteurized whole milk in the College Park area. One-half gallon cartons (4,417) were surveyed at six food chains in two different geographical locations. Each location was sampled three times.

Approximately 65 percent of the cartons were less than two days past the date of pasteurization. No coliforms were detected in any of the samples at the time of purchase. Nearly 99 percent of the samples were acceptable to a trained panel, compared to 78 percent following seven days storage. The scientists concluded that the quality of milk examined was quite satisfactory and that the "sell by date" of seven days not be shortened.

Hay Preservatives

Farmers are interested in finding ways of preserving hay baled at moisture levels too great to be stored under conventional systems. Use of ammonium isobutyrate can take over where conventional systems can't. Cooperative work between the Departments of Agronomy and Dairy Science identified the moisture and application rate best suited to hay preservation. Animal acceptance of hay preserved with ammonium isobutyrate is excellent. There is no indication that the process reduces dry matter consumption. The preservative also serves as a non-protein nitrogen, and results in a reduced temperature rise of the baled hay with less damage to the protein present.

ENTOMOLOGY

Mosquito Control

Studies on the biology of Maryland mosquitoes have furnished information useful in perfecting techniques for control and in preparing for emergencies resulting from outbreaks, of mosquito borne diseases.

New facts were discovered about the developmental rates, seasonal distribution, migration and blood feeding habits of the mosquito which transmits eastern equine encephalitis. With new knowledge the disease can be more effectively managed in horses, man and pheasants.

Investigations are underway studying dog heartworm, another mosquito-borne disease.

Hatching response of mosquito eggs is under study to predict when large populations can be expected. Increased knowledge of mosquito biology and behavior helps in effective control and contributes to improvement of living conditions and the expansion of recreational opportunities.

Mexican Bean Beetle Control

Mexican bean beetle damage to Maryland's soybean crop takes hundreds of thousands of dollars away from the farming community each year. Insecticides and other chemical means of combating this pest cost thousands of dollars also. The Entomology Department of Maryland's Agricultural Experiment Station is devising another method to combat this costly insect. Studies have shown that a parasite, *Pediobius foveolatus*, greatly reduces the population of this insect without chemical controls. The parasite feeds solely on the Mexican bean beetle and, since it is native to India, cannot overwinter in Maryland. Releases of the parasite in 1974 in 12 Maryland counties demonstrated how effective the parasite is. The savings that can be passed to the farmers and purchasers of soybeans in the Delmarva area could run into the millions of dollars.

New Tomato Variety

Several factors threatened to drive the Maryland tomato processing industry to extinction a few years ago. However, a cooperative effort by the industry, research and extension helped to reverse the trend. A key part of the program has been the development of highly productive varieties that are disease resistant, concentrated in fruit set and ripening, adapted to machine harvesting and handling, and requiring minimum hand labor. The Dorchester variety, released in 1971, has been accepted as the best available for whole-pack tomatoes. About 1,000 acres were planted in Dorchester in 1974. This is equivalent to about 25 percent of the processing acreage in Maryland. The estimated farm value of the Dorchester crop in 1974 was $1,170,000, with the final product value being nearly $2,800,000.

Total Plant Utilization

About 20-30 percent of the vegetable plant reaches the processing or packaging plant, at which point 30-90 percent of the material is processed for human consumption. The rest creates a waste disposal problem. An extensive program was undertaken to utilize the entire vegetable plant as food, feed and other by-products.

For example, an acre of tomatoes will produce a total weight of about 50 tons of vegetable plants. About 20 tons of fruit are harvested and brought to the processing plant. Half of this is processed into an assortment of tomato products. The cull tomatoes, peels, cores and trimmings constitute an additional 10 tons of nutritious food and contain 22 percent protein. The 30 tons of tomato vines left in the field contain 16 percent protein. A relatively simple procedure was developed whereby most of the protein was extracted to provide a "tomato protein concentrate", and the residual cake still contains sufficient protein to make it a more valuable feed than corn. In addition, an alkaloid, "tomatine," useful as a cholesterol precipitating drug and as an insecticide, is recovered in substantial quantities.

Measuring Nutritional Value

Until recent years, sensory (appearance, texture, flavor) quality determined the grade and consequently the market value of foods. Sensory quality was left to the subjective appraisal of government or private inspectors. Researchers in the Department of Horticulture saw the need for a more objective method of appraisal.

A program was set up to develop rapid instrumental methods for measuring nutritive value. Thus far, instrumental techniques have been developed for measuring the major nutrient components (protein, fat, carbohydrates and water) and minerals. Work is underway to develop rapid instrumental methods for vitamin analysis.

Processed Food Quality

Studies have shown that although processed (canned, frozen or dehydrated) foods are stabilized in the sense that they will not undergo microbiological spoilage, their nutritive and sensory quality is not necessarily stabilized. For example, canned green beans, which are usually rich in vitamin C, lose about half of the vitamin C in six months' common storage. Green beans retain only a negligible quantity after a year's storage in room temperature. If stored in the refrigerator, the vitamin C content is maintained for a year or longer.

Similar studies are underway, particularly for prepared convenience foods, to provide food processors and consumers with information on changes in nutritive value resulting from time and temperature storage.

In the past, after the fruit was harvested from the vines, the vines were left to deteriorate in the field. Now, thanks to research at the Experiment Station, these vines and plants can be utilized in other products.

POULTRY SCIENCE

Checking Protein Diets

Broilers have to have certain amino acids in order to maintain good growth. In the past, birds had to be weighed or each feed had to be weighed to determine if the broiler diet contained the amino acids needed. Now, scientists at the University of Maryland have developed a simpler method for evaluating the protein or amino acid status of the broilers. They simply count the number of body feathers found in a given area of the broiler pens. Birds on inadequate protein diets will eat loose body feathers. Therefore, low feather counts will appear. The reverse is true for birds on an adequate diet. Once the deficiency is discovered and the specific amino acid is added to the diet, the number of feathers increase. The feather counting method will eliminate much labor involved in regulating the diets of broilers.

Corn and Barley Trials

Historically, a lower cost of production has resulted in a lower cost of chicken for the consumer. Work with corn varieties XL-2202, M-65 and the barley variety Naked barley, has shown them to have a higher protein content of better nutritional quality than most other corn and barley varieties grown in Maryland. These findings make it feasible to provide nutritionally well-balanced animal protein for people at lower cost. The use of these better corn and barley varieties could save the industry as much as $1,000,000 per year.

Corn and Color

People prefer to eat eggs with a yellow yolk and buy broilers with a yellow pigmented skin. The yellow color is due to xanthophyll compounds. It has been shown that the corn variety 3369-A is the most potent source of xanthophyll of any Maryland-grown variety. It is estimated that the use of 3369-A corn could save 70 cents per ton of finisher diet used. The overall savings in the Delmarva area could be $650,000 per year.

Egg production in Maryland is an important industry. However, shoppers want an egg that has a yellow yolk and is high in protein. In order to accomplish this, the birds must have xanthophyll in the diet. Poultry scientists have discovered a corn variety which is high in xanthophyll.

Broiler production, especially on the Eastern Shore, is one of the largest agricultural enterprises in the state. Research with broilers is carried on in feeding, breeding, processing, management and environmental controls.

VETERINARY SCIENCE

New Viruses Isolated

Two new viruses, bovine respiratory syncytial and type 2 bovine adenovirus, were isolated for the first time in Maryland. However, it is still not understood what economic impact these viruses have on the cattle industry. Their roles are still being studied.

It was shown that the respiratory viruses had no relationship to the herpesvirus strain DN-599, a strain which had caused some respiratory disease problems in cattle in Maryland before.

Detecting IBV

A test was developed to measure infectious bronchitis virus (IBV) antigen. Experimentally, the test could detect the IBV as early as six days after infection. This is important because IBV has been a serious problem contributing to respiratory diseases of chickens on the Delmarva peninsula.

The test can be used in research on IBV with individual chickens or it could be used on a field flock basis to determine if the chickens are immune to IBV after vaccination with the Massachusetts 41 strain of IBV, a vaccine presently used to treat for IBV.

Other viral agents associated with diseases of chickens are being studied using the principles involved in this test.

Equine Viruses Studied

Research on virus complexes in young horses and foals helped to isolate an equine adenovirus, found in foals with severe respiratory disease, and an adeno associated virus which had never been reported before.

Studies are being carried on using ponies to study the significance of the adeno virus and its role in respiratory infection of foals.

Also, under the same project, a vaccine which had been marketed commercially for treatment of equine rhinopneumonitis (a two fold virus which could cause a respiratory disease in foals or abortion in mares) was studied. Results of the study showed that the vaccine offered questionable protection for either the foals or mares. Other commercial vaccines are currently being evaluated.

From Groundhogs to Goats

Nearly everybody has heard of how scientists use rats for experimental purposes, but scientists at the Maryland Agricultural Experiment Station are utilizing groundhogs. Groundhogs respond very favorably to cold stress and have high disease resistance.

From the research, many questions relating to treating humans exposed to cold have been raised. Research is continuing on the effects of cold stress in ruminants. This time a group of miniature goats will be used.

Dr. Tom Albert, Research Veterinarian, holds one of the pygmy goats which will be used to continue studies dealing with the effects of cold stress on disease resistance in animals.

FINANCIAL STATEMENT 1973-1974

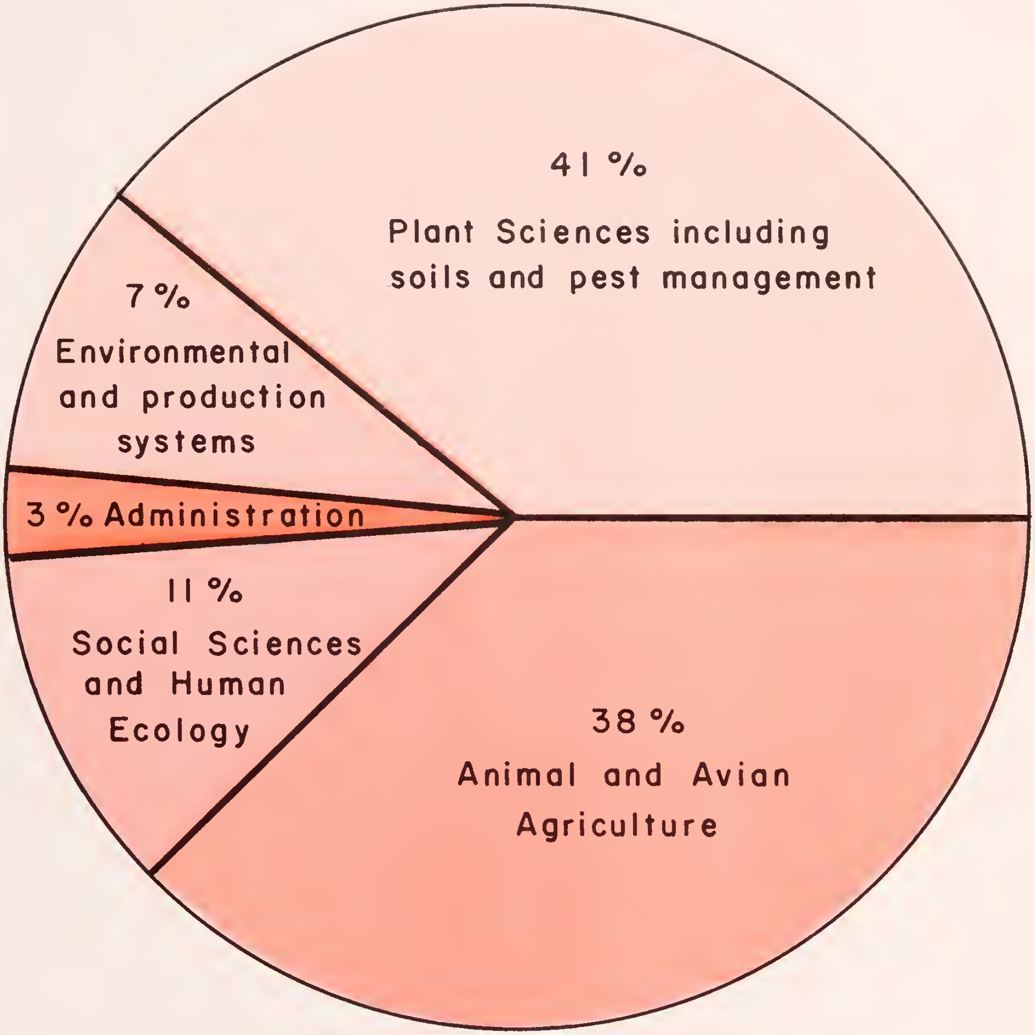
Source of Income

General	
Hatch (requires matching above $90,000)	$ 730,529
McIntire-Stennis (requires matching)	72,880
Hatch RRF	249,093
	$1,052,502
State Appropriation	2,807,525
Total	$3,860,027

Expenditure by Major Research Areas

Animal, Avian Agriculture	$1,454,519
Plant Sciences and Soils	1,592,027
Environmental and Production Systems	263,958
Social Sciences and Human Ecology	422,581
Administration	126,942
*Total	$3,860,027

* Included in the expenditures are $2,956,227 for salaries and $903.800 in operating expenses.


41 %
Plant Sciences including soils and pest management
7 %
Environmental and production systems
3 % Administration
11 %
Social Sciences and Human Ecology
38 %
Animal and Avian Agriculture

DO NOT CIRCULATE

UNIVERSITY OF MARYLAND
College Park, Md. 20742

AGRICULTURAL EXPERIMENT STATION
R. L. Green, Acting Director

Annual Report
Penalty for private use, $300

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF
AGRICULTURE
AGR 101

THIRD CLASS

U.S.MAIL

The University of Maryland is an equal opportunity institution.

UNIVERSITY OF MARYLAND AT
COLLEGE PARK LIBRARIES